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**APPENDIX F
PART I
FIELD SAMPLING PLAN**

**ENVIRONMENTAL CONSERVATION AND
CHEMICAL COPORATION
(ECC) SITE
ZIONSVILLE, INDIANA**

**PREPARED FOR:
ECC SETTLING DEFENDANTS**

MARCH 1, 1989

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1.0 INTRODUCTION

This Sampling and Analysis Plan, attached as Appendix F of Exhibit A for the Consent Decree for the Environmental Conservation and Chemical Corporation (ECC) site has been developed and is being submitted in accordance with Exhibit A. The Sampling and Analysis Plan consists of Part I - Field Sampling Plan (FSP) and Part II - Quality Assurance Project Plan (QAPP).

The Field Sampling Plan presented herein guides all field work by defining the sampling and data-gathering methods to be used for the ECC Remedial Action in detail. The Field Sampling Plan was developed in conformance with the USEPA draft document "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (RI/FS Guidance) dated March, 1988. Guidelines developed for the selection and definition of field methods, sampling procedures, and custody were based on the USEPA document "Compendium of Superfund Field Operations Methods" (Compendium) dated December, 1987. Data Quality Objectives (DQOs) were developed in accordance with USEPA publication "Data Quality Objectives for Remedial Response Activities" (DQO Guidance) dated March, 1987.

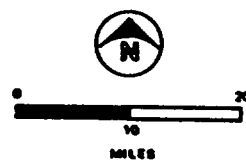
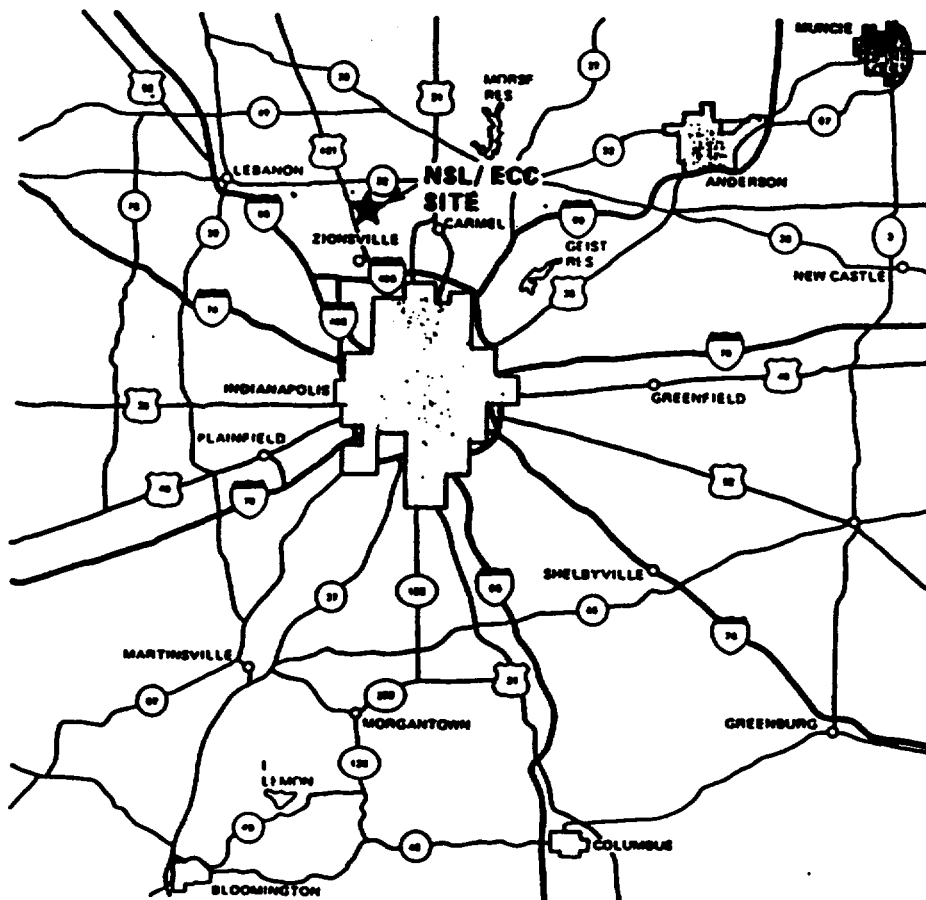
2.0 SITE BACKGROUND

2.1 Site Description

The ECC site is located in Boone County, approximately 10 miles northwest of Indianapolis, on US Highway 41 in Zionsville, Indiana (Figure 2-1). The site occupies 6.5 acres west of the Northside Sanitary Landfill (NSL), an operating solid waste disposal facility. The ECC site is bounded on the south and east by NSL landfill property. An unnamed ditch separates the two facilities along the east boundary (Figure 2-2).

ECC began operations at the site in 1977 and was engaged in the recovery, reclamation, and brokering of primary solvents, oils and other wastes. Waste products were received in drums and bulk tankers and prepared for subsequent reclamation or disposal. Reclamation processes included distillation, evaporation and fractionation to reclaim solvents and oil.

USEPA investigations into accumulation of contaminated storm water on-site, improper drum inventory, and several spill incidents lead to civil law suits, and finally placement of ECC into receivership in July, 1981. Drum shipments to the site were halted in February, 1982. Surface cleanup activities conducted by USEPA contractors during 1983 and 1984 included removal of cooling pond waters, waste drums, tank waste, contaminated soil, and cooling pond sludge.

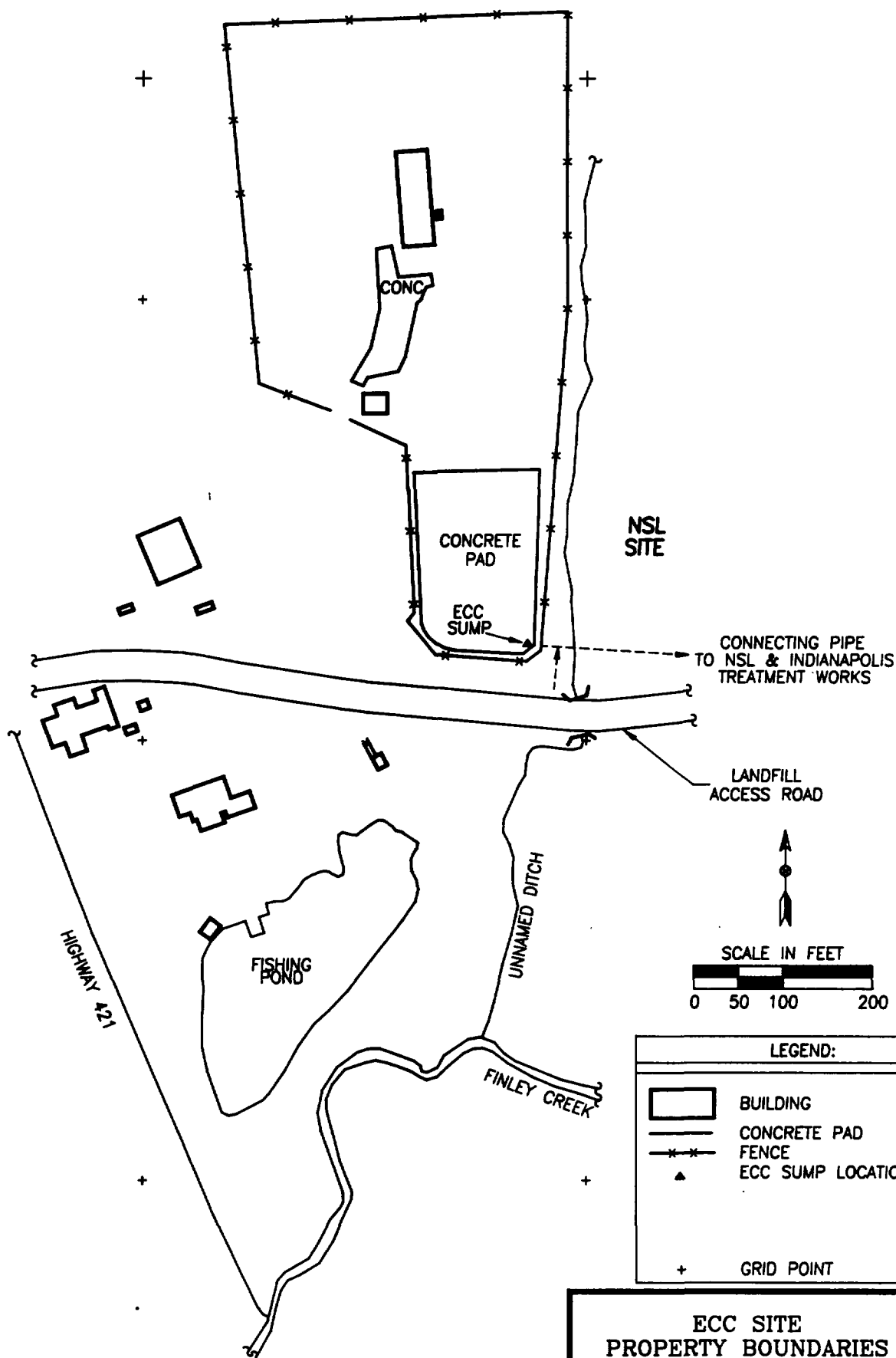


ECC SITE
LOCATION MAP

FIGURE
2-1

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ECC SITE
PROPERTY BOUNDARIES

FIGURE
2-2

A Remedial Investigation/Feasibility Study was conducted by CH2M-Hill for the USEPA and the Record of Decision (ROD) for the site was published on September 25, 1987.

3.0 SAMPLING OBJECTIVES

The sampling activities will:

- o Detect VOCs migration to the ground water and surface water; and
- o Verify and monitor the effectiveness of the remediation.

The overall Data Quality Objective (DQO) is to collect high quality data in sufficient quantity to achieve the highest level of confidence and, therefore, the lowest level of uncertainty. The selection of both the sampling and the analytical approaches for the ECC project was made to achieve this DQO as described in the following sections.

4.0 SAMPLE LOCATION AND FREQUENCY

Field investigations will include ground water monitoring, and surface water sampling.

Where ascertainable, specific sampling locations associated with each technique are presented in Figure 4-1 along with the sampling frequency. Detailed procedures for sample collection for each media are presented in Section 6.0. Major equipment associated with sample collection are discussed in the Attachments to Part II of the Quality Assurance Project Plan.

4.1 Ground Water Monitoring

Prior to ground water sampling, each well will be purged a minimum of three (3) well volumes and until indicator parameters have stabilized, or to dryness depending upon recovery rates. Samples from the off-site wells will be collected quarterly during site soil remediation and analyzed for the parameters in Table 3-1 of Exhibit A, presented here as Table 4-1. Monitoring will be continued on a semi-annual basis as specified in Section 2.1.4 of Exhibit A. Hydrologic properties to be evaluated during this phases of the sampling program include the measurement of static water levels. Detailed procedures for water level measurement are described in Section 6.1.2.1.

4.2 Surface Water

Surface water sampling locations are show in Figure 4-1. Surface water will be analyzed in the field for pH, specific conductance, and temperature, and will be analyzed for the parameters in Table 4-1 in a Contract Laboratory Program (CLP) Laboratory.

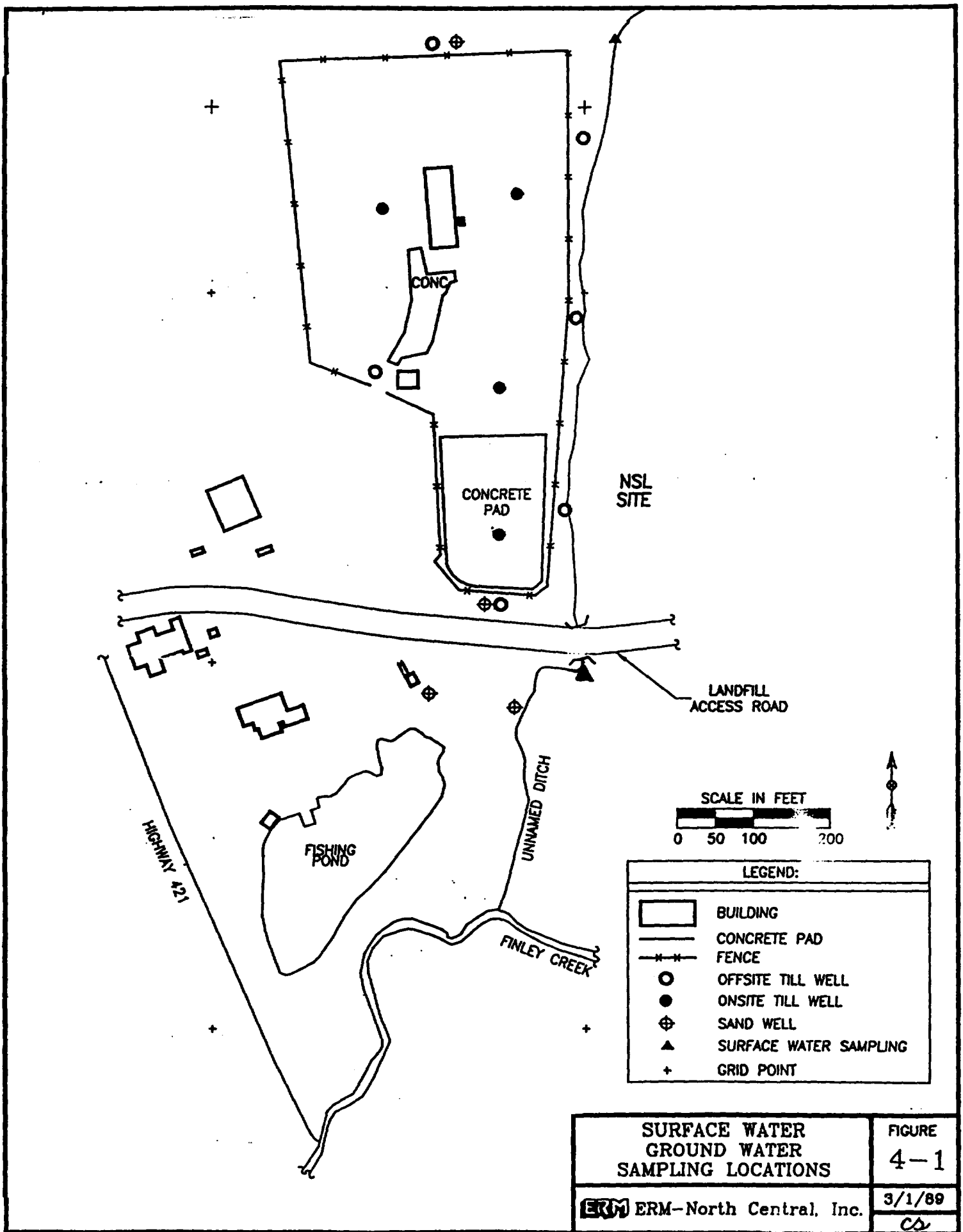


TABLE 4-1

**DATA COLLECTION SUMMARY
GROUND WATER SAMPLING**

<u>Parameter</u>	<u>Investigative Samples</u>	<u>QA/QC Samples (1)</u>		<u>Matrix Total (2)</u>
		<u>Replicates</u>	<u>Field Blank</u>	
<u>o Field</u>				
pH	14	2	2	18
Specific Conductance	14	2	2	18
Temperature	14	2	2	18
<u>o Laboratory Organics*</u>				
Volatiles	14	2	2	18
Base Neutrals	14	2	2	18
Acid Extractables	14	2	2	18
PCBs	14	2	2	18
<u>Inorganics *</u>				
Metals (Dissolved)	14	2	2	18
Cyanide	14	2	2	18

(1) QA/QC samples are as defined in Appendix C, Part 6 of the USEPA DQO Guidance.

(2) Plus trip blanks collected and analyzed at a frequency of one (1) per shipping container.

(3) Organic and Inorganics listed in Table 7-1 of Appendix E.

5.0 SAMPLE DESIGNATION

A sample numbering system has been developed for the ECC project. Each sample will be designated to include the following sequential information:

- o Name of Site - ECC (ECC).
- o Sample or Well No. - Sample designations as follows with appropriate numbers, as necessary: Field Blank (FB), Field Replicate (FR), Trip Blank (TB), and Background (B). Other samples/wells as designated in field.
- o Sample Round.
- o Sample Matrix, Ground Water (GW), Surface Water (SW), and Sediment (SD).

For example, for a monitoring well designated MW1 in the first round of ground water sampling, the sampling number would be as follows: ECC-MW1-1-GW.

All field samples will be identified with sample identification labels consisting of gummed paper labels that include the above sample number and the following additional information:

- o Name of collector.
- o Affiliation of collector.
- o Day and time and collection.
- o Analysis request.
- o Analysis code.

6.0 SAMPLING PROCEDURES AND EQUIPMENT

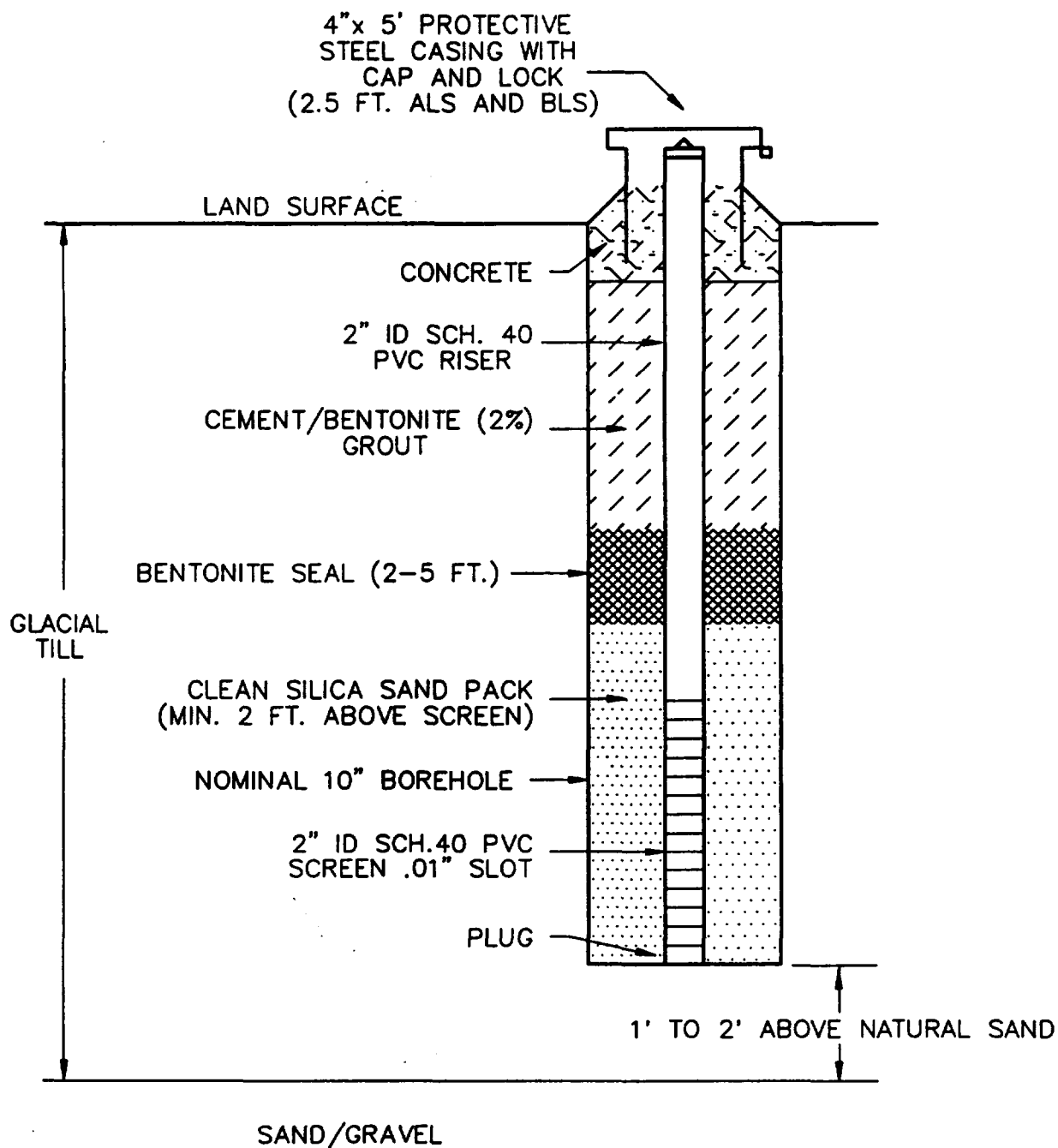
Details procedures for sample collection are presented below along with a general description of the proposed sampling equipment. Detailed information pertaining to major equipment operation, maintenance, and calibration is presented in the Attachments of Part II - Quality Assurance Project Plan.

6.1 Ground Water Monitoring

This section details standard procedures and includes the design and installation of monitoring wells and ground water sampling.

6.1.1 Monitoring Well Design & Installation

The ground water monitoring network will consist of fourteen (14) wells, which will be located on, around the periphery of, and downgradient from the ECC site. Ten (10) wells will be installed in the till completed in the saturated zone and four (4) wells will be completed in the sand and gravel unit underlying the saturated surface till. The wells will be constructed of 2-inch PVC. Screen length will vary for well. Total depth for the off-site wells completed in the till will be 2 feet less the total depth to the contact between the till underlying sand and gravel. On-site wells will be screened from one foot above trenches bottom to 1-2 feet above the contact between the till and underlying sand and gravel. Wells completed in the sand and gravel will be screened the total thickness of that sand and gravel unit. Figures 6-1, 6-2, and 6-3 present schematic



ECC-TYPICAL MONITORING WELL
CONSTRUCTION DETAIL
OFF-SITE WELL IN GLACIAL TILL

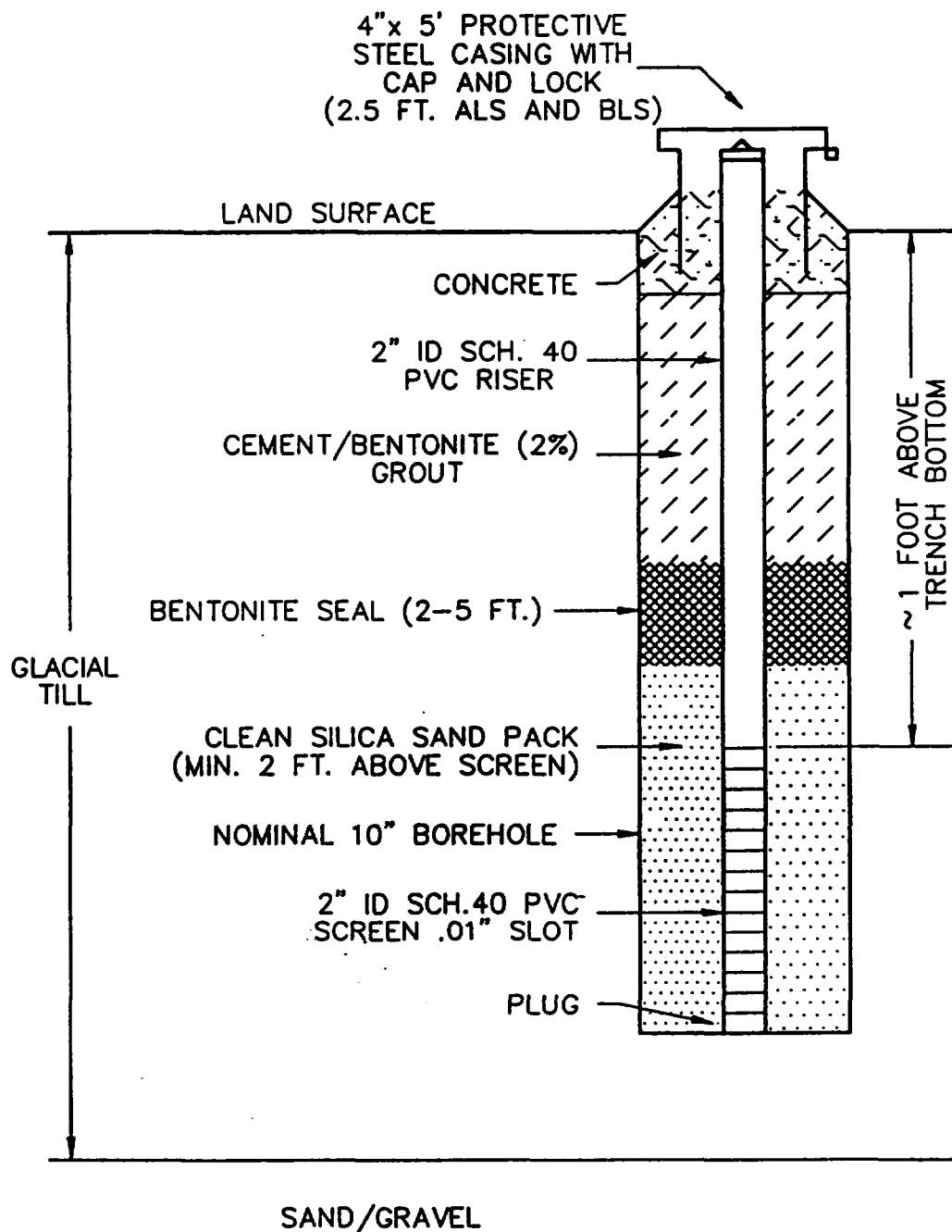
FIGURE

6-1

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NOT TO SCALE

ECC-TYPICAL MONITORING WELL
CONSTRUCTION DETAIL
ON-SITE WELL IN GLACIAL TILL

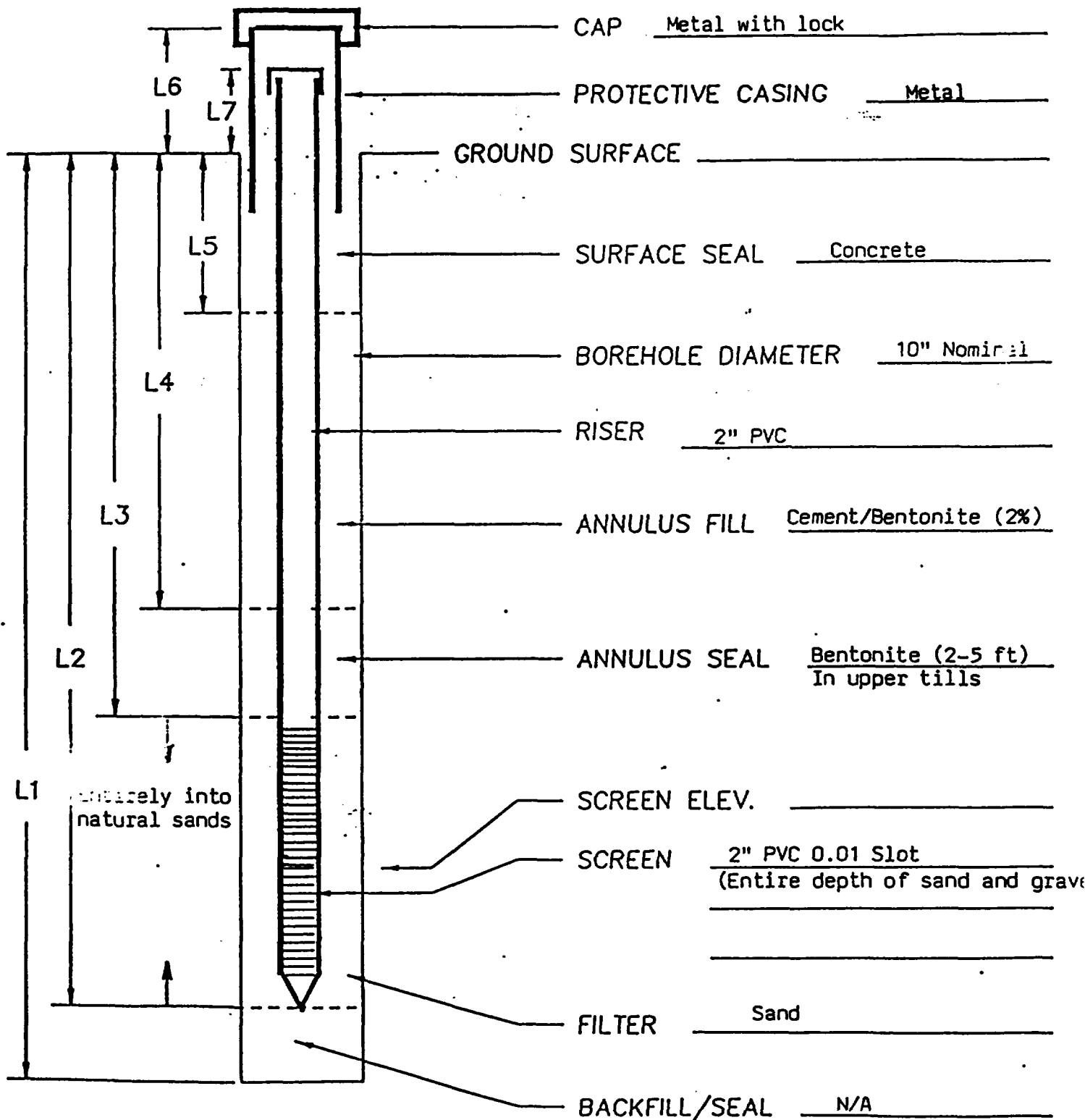
FIGURE
6-2

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MONITORING WELL CONSTRUCTION



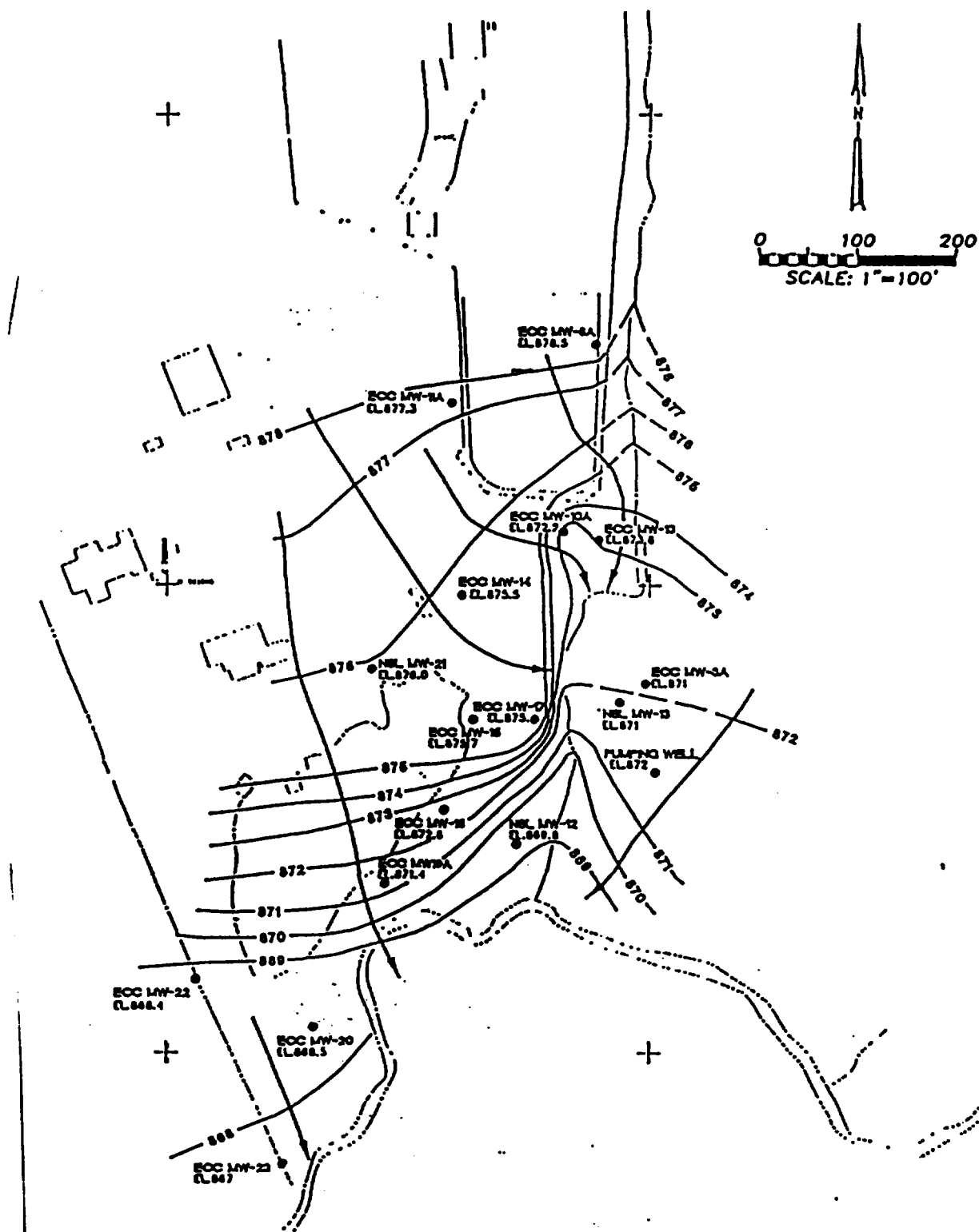
diagrams of final well construction for the off-site and on-site monitoring wells in the till, and the monitoring wells in the sand and gravel unit, respectively.

The location of the monitoring wells is based on the ground water elevation contours shown in Figure 6-4.

The following procedures will be used to install the monitoring wells:

- o Wells will be advanced using a nominal six-inch I.D. hollow stem auger to total depth.
- o Soil above the water table in the shallow water table wells will be logged and sampled with a two-inch diameter split spoon sampler. Split spoon samples of the soil below the water table in the shallow, water table well will be taken and logged every five feet.
- o A single soil sample will be collected from the screened interval portion of each monitoring well installed at the site by using the split spoon sampler with a spring retainer attachment. This sample will be analyzed for grain size distribution.

7
o
soil
samples
where



LEGEND

- 866 — POTENTIOMETRIC SURFACE CONTOUR FOR SAND AND GRAVEL AQUIFER. CONTOUR INTERVAL: 1 FOOT.
- - - 868 - - - INFERRED POTENTIOMETRIC SURFACE CONTOUR
- DIRECTION OF GROUNDWATER MOVEMENT IN SURFICIAL AQUIFER

NOTE: Contours have been drawn to suggest that the pond is not hydraulically connected to the sand and gravel aquifer. This relationship has not been fully established.

From CH2M HILL Technical Memorandum No. 2, dated September 16, 1988.

**POTENTIOMETRIC SURFACE MAP
OF UPPER SAND AND
GRAVEL AQUIFER**

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FIGURE

6-4

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- o For the on-site monitoring wells, a soil sample will be collected at every 2 foot interval beginning at the 1 foot to 3 foot interval up to the 9 feet depth using a split spoon sample. These samples will be analyzed for organic carbon content using the walkey-Black chronic acid titration method.
- o The well screen will be two-inch diameter PVC with No. 10 (0.010 inch) continuous slot openings. PVC riser will extend above the water table and PVC pipe from there to the surface completion. Screened risers will be installed in the boring prior to removal of the augers.
- o The formation will be allowed to collapse around the screen and rise to a maximum of 2-feet above the screen. If the formation does not collapse or fill the annular space to this level, clean silica sand will be added.

The sand will be free of silt and of an appropriate size for the well screen slot opening.

- o A minimum of two feet of compressed bentonite pellets will be placed above the sand pack to seal the annular space around the casing.

- o The remaining space above the bentonite seal will be filled with a cement-bentonite grout placed with a tremie pipe. The grout seal shall be prepared of an approximate mixture of one bag of Portland cement, five pounds of bentonite powder, and ten gallons of water.
- o The rise pipe will be fitted with a vented cap.
- o A four-inch diameter protective steel casing with hinged locking steel cover will be cemented in place to a depth of 2.5 feet below the ground surface. The cement will be sloped away from the casing to promote drainage away from the well. All equipment used in construction of the well will be decontaminated prior to initiation of well construction. Drilling augers will be steam cleaned between each boring.

Following installation, monitoring wells will be developed to provide low-turbidity, representative ground water samples. Well development will be completed no sooner than 24 hours following the grouting of the wells. Each well will be developed by surging and pumping until at least three well volumes have been removed; the well yields low turbidity water; and consistent values of pH, conductivity and temperature have been obtained. Equipment used in well development may include surge blocks,

bailers, or pumps. Ground water removed during well development will be collected, stored in containers and handled as appropriate based on results of chemical analysis.

6.1.2 Ground Water Sampling

Samples from these wells will be collected quarterly during site soil remediation and analyzed for the parameters in the Table 4.1. Monitoring will be continued on a semi-annual basis as specified in Section 2.1.4 of Exhibit A.

6.1.2.1 Water Level Measurement

Static water levels will be measured and recorded at each sampling episode and on a monthly basis during field investigations. The water level surface will be measured prior to well development and sampling using a Solinst water level meter. Before lowering the probe in the well, the batteries will be checked by pressing the test button on the instrument for this purpose. The probe will be slowly lowered into the well until contact with the water surface is indicated. The probe will be withdrawn just above the water surface and a second reading will be taken prior to withdrawing the electric tape from the well. The reading will be recorded on the Ground Water Sampling Form.

Each well will have a reference point, indicated on the well casing, from which water level measurements will be taken. The reference point elevation on the well will be established by a survey with respect to US Datum mean sea level elevation to an accuracy of 0.01 feet for computation of ground water elevation.

6.1.2.2 Well Depth Measurement

The total depth of the well will be measured and recorded prior to well development and sampling. A weight tied to a length of cotton cord will be used to tag the bottom of the well and the length of cord used will be measured to establish well depth.

6.1.2.3 Well Evacuation

Standing water in the wells will be removed prior to sampling by purging three (3) well volumes from each well and until stabilization of temperature, pH, and specific conductance is achieved. If the well goes dry before three well volumes have been removed, samples will be taken as soon as the well recovers. The calculation of well volume will be as follows:

- o Measure well casing inside diameter.
- o Determine the static water level below the measuring point.
- o Determine the total depth of the well from the measuring point.
- o Calculate the number of linear feet of static water (total depth of the well minus the static water level).

- o Calculate the static volume in gallons. The static volume (well volume) is calculated in gallons as $V = (\pi r^2)(h)(7.48)$, where

$$\pi = 3.14,$$

r = well radius (ft). and

h = linear feet of static water (ft.).

Dedicated Teflon bailers will be used for purging and sampling the wells. Purged water will be placed in containers for subsequent handling based upon results of chemical analysis. Bailers, ropes, pumps and all equipment shall be decontaminated prior to insertion into the well.

6.1.2.4 Sample Withdrawal

During sample withdrawal, special care will be taken to avoid physically altering or chemically contaminating samples. Sampling will be performed with bottom filling Teflon bailers. Ground water pH, specific conductance, and temperature will be determined in the field on secured samples and field filtration will be performed for metal parameters for ground water samples. Samples will be collected in the following order:

- o Volatile organics in Table 4-1
- o Base neutral and acid extractable organics in Table 4-1
- o PCB in Table 4-1
- o Inorganics in Table 4-1

Samples for inorganics in Table 4-1 analysis will be prepared, preserved, and stored as listed in Table 7-1. One (1) replicate sample will be obtained for every ten (10) ground water samples collected.

The objective of ground water sampling for inorganics in Table 4-1 is to determine the concentration of dissolved inorganic constituents. Therefore, ground water samples must be filtered through a non-metallic 0.45 micron membrane immediately after collection. The first 150 to 200 ml of filtrate will be used to rinse the filtration apparatus of any contaminants. This technique minimizes the risk of altering the composition of the samples by the filtering operation. The filtrate will be collected in a polyethylene bottle and immediately acidified to pH <2 using nitric acid.

A maintenance and calibration program will be implemented to ensure that routine calibration and maintenance are performed on the instruments associated with ground water sampling. The program will be administered by the field team leader who will perform routine preventative maintenance (e.g., cleaning or other procedures identified in the instrument manual) on a weekly basis and calibration of field instruments on a daily basis. Calibration, operation, and maintenance of all field instruments will be documented in the field log book, and all field personnel will maintain their proficiency. Operating procedures outlined in the manuals for each respective instrument will be followed. For pH, pre-calibration will consist of using three (3) buffer solutions (pH 4, 7, and 10) and calibration verification at regular intervals (at least once a day). The two pH measurements

must each be within ± 0.05 standard units of buffer solution values. The specific conductance meter will be calibrated using liquids of known specific conductance. Should specific conductance readings vary by more than 5% from the expected value, the unit will be repaired or replaced.

6.2 Surface Water Sampling

The surface water will be monitored by sampling the Unnamed Ditch just upgradient and just downgradient of the ECC site (Figure 4-1). Surface water will be sampled at the same frequency as ground water and analyzed for the same parameters. Monitoring will be continued on a semi-annual basis as specified in Section 2.1.4 of Exhibit A.

7.0 SAMPLE HANDLING AND ANALYSIS

The required sample containers, preservation methods, maximum holding times, and filling instructions for each sample type are summarized on Table 7-1. Notations of which laboratory will be performing the analysis of the collected samples are also indicated on Table 7-1.

**TABLE 7-1
SAMPLE CONTAINER AND PRESERVATION REQUIREMENTS**

<u>Vapor Parameters(1)</u>	<u>Container</u>	<u>Preservation</u>	<u>Maximum Holding Time</u>	<u>Filling Instructions</u>
Organics in Table 4-1	Activated Carbon Cartridge	Cool 4°C	7 days	Cap cartridge ends
<u>Ground Water/Surface Water Parameters</u>				
* Volatile Organics	2 x 40 ml Glass Vials with Teflon-lined septum	Cool 4°C	10 days	Zero headspace, no air bubbles
Base Neutral Organics and Acid Extractable * Organics	3 x 1 liter amber glass bottles with Teflon-lined cap	Cool 4°C	5 days	Fill to neck of bottle
PCBs	2 x 1 liter amber glass bottles with Teflon-lined cap	Cool 4°C	5 days	Fill to neck of bottle
* Metals in Table	2 x 500 ml Polyethylene bottle	0.45 u Filtration (Ground Water Only) HNO ₃ to pH<2 Cool 4°C	6 months (H ₂ O 20 days)	Fill to neck of bottle
Cyanides	1 x 1 liter glass bottle with Teflon-lined cap	NaOH to pH>12 Cool 4°C	14 days	Fill to neck of bottle

Note: All samples will be shipped by overnight carrier to their final laboratory destination under custody.

* Listed in Appendix E Table 7-1.

8.0 FIELD QUALITY CONTROL SAMPLES

- o Field blank samples are defined as samples which are obtained by running analyte-free ionized water through sample collection equipment (bailer, pump, auger, etc.) after decontamination. These samples must be collected and analyzed at a frequency of one per group of 10 or fewer investigative samples.
- o Trip blank samples, which are required for aqueous volatile organic samples only, are prepared in the laboratory prior to the sampling event in actual sample containers and shipped with empty sample containers to the field. They are kept capped throughout the sampling event. When the sampling event is completed, they are shipped with investigative samples back to the lab for analysis. Trip blank samples are collected at a frequency of one per shipping cooler.